

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s): Boer et al.
Case: 10-6-6-6
Serial No.: 10/562,619
Filing Date: May 26, 2006
Group: 2473
Examiner: Candal Elpenord

Title: Method and Apparatus for Backwards Compatible Communication in a Multiple
Input Multiple Output Communication System with Lower Order Receivers

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby appeal the final rejection dated November 1, 2010, of claims 22-24, 26-28, and 42-65 of the above-identified patent application.

REAL PARTY IN INTEREST

The present application is assigned to Agere Systems Inc., as evidenced by an assignment recorded on May 24, 2006 in the United States Patent and Trademark Office at Reel 017680, Frame 0233. The assignee, Agere Systems Inc., is the real party in interest.

RELATED APPEALS AND INTERFERENCES

An Appeal Brief was filed for the present application on August 6, 2009. An Appeal Brief was filed for related United States Patent Application Serial No. 10/562,618 on August 30, 2010.

STATUS OF CLAIMS

The present application was filed on May 26, 2006 with claims 1 through 41. Claims 5, 18, 25, and 29 were cancelled in the Amendment and Response to Office Action dated April 28, 2008. Claims 31-33 and 35-37 were cancelled in the Amendment After Final Rejection dated April 22, 2009. Claims 42-65 were added and claims 1-4, 6-17, 19-21, 30, 34, and 38-41 were cancelled in the Amendment and Response to Office Action dated February 9, 2010. Claims 22-24, 26-28, and 42-65 are presently pending in the above-identified patent application. Claims 22, 26, 52, and 59 are rejected under 35 U.S.C. §102(e) as being anticipated by Kuchi et al. (United States Patent No. 7,065,156), and claims 23, 24, 27, 28, 43, 44, 45-51, 53-58, and 60-64 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kuchi et al. in view of Gardner et al. (United States Publication No. 2005/0233709).

Claims 22, 26, 52, and 59 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 22 is directed to a method for receiving data on at least one receive antenna (FIG. 1: 115) transmitted by a transmitter (FIG. 1: TX) having a plurality of transmit antennas (FIG. 1: 110) in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas (page 10, lines 13-26, and page 11, lines 8-27); and

deferring for said indicated duration (page 11, lines 24-25).

Independent claim 26 is directed to a receiver (FIG. 1: RX) in a multiple antenna communication system having at least one transmitter (FIG. 1: TX) having a plurality of transmit antennas (FIG. 1: 100 and 110; page 4, lines 18-26), comprising:

at least one receive antenna (FIG. 1: 115) for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication can

be interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of antennas (page 10, lines 13-26, and page 11, lines 8-27); and

means for deferring for said indicated duration (page 11, lines 24-25).

Independent claim 52 is directed to a method for transmitting data by a transmitter (FIG. 1: TX) having a plurality of transmit antennas in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), said method comprising the step of:

determining an indication of a duration to defer until a subsequent transmission (page 5, lines 8-25; and page 11, line 8, to page 12, line 7); and

transmitting said indication of said duration to defer until said subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas (page 5, lines 8-25; and page 11, line 8, to page 12, line 7).

Independent claim 59 is directed to a transmitter (FIG. 1: TX) in a multiple antenna communication system (FIG. 1: 100; page 4, lines 18-26), comprising:

N transmit antennas for transmitting at least one training symbol using at least one of said N transmit antennas and transmitting an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas (page 5, lines 8-25; and page 11, line 8, to page 12, line 7).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 22, 26, 52, and 59 are rejected under 35 U.S.C. §102(e) as being anticipated by Kuchi et al., and claims 23, 24, 27, 28, 43, 44, 45-51, 53-58, and 60-64 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kuchi et al. in view of Gardner et al.

ARGUMENT

Independent Claims 22, 26, 52 and 59

Independent claims 22, 26, 52 and 59 were rejected under 35 U.S.C. §102(e) as being anticipated by Kuchi et al. Regarding claim 22, the Examiner asserts that Kuchi discloses receiving an indication of a duration to defer until a subsequent transmission (col. 4, lines 29-35,

and col. 3, lines 27-37), said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field (FIG. 1b-1c, 3a-3b; where the training symbols are phase shifted) across said plurality of transmit antennas (col. 3, lines 13-18, and col. 5, lines 38-54).

Appellants note that independent claims 52 and 59 are directed to the corresponding transmitting method and transmitter for the receiving method and receiver of independent claims 22 and 26, respectively. Thus, independent claims 22 and 26 require receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas. Independent claims 52 and 59 require transmitting an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas.

Appellants note that the present disclosure teaches “diagonally loading” in FIGS. 4 and 6 and the associated text. As seen in FIG. 4, “diagonal loading” requires, for each antenna, transmitting on a particular distinct set of subcarriers while nulling the other subcarriers. Clearly, a patentee is entitled to be his own lexicographer. See, e.g., *Rohm & Haas Co. v. Dawson Chemical Co., Inc.*, 557 F. Supp 739, 217 U.S.P.Q. 515, 573 (Tex. 1983); *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 228 U.S.P.Q. 90 (Fed. Cir. 1985); and *Fonar Corp. v. Johnson & Johnson*, 821 F.2d 627, 3 U.S.P.Q.2d 1109 (Fed. Cir. 1987).

The interpretation of the term “diagonally loading” asserted by the Examiner is inconsistent with the definition provided in the specification and is not how the term would be understood by a person of ordinary skill, based on the specification. When the specification explains and defines a term used in the claims, without ambiguity or incompleteness, there is no need to search further for the meaning of the term. *Multiform Desiccants Inc. v. Medzam Ltd.*, 133 F.3d 1473, 45 U.S.P.Q.2d 1429, 1433 (Fed. Cir. 1998).

Kuchi, on the other hand, teaches to delay a signal and phase shift a signal. In particular, Kuchi teaches:

In the embodiment of FIG. 1a, transmitter 100 receives input data stream at input 102 and generates an input symbol stream at the output of CIM 104. X(t) is split into two identical symbol streams, with one symbol stream X(t)

being input to RF circuitry 112a and phase shifter block 110. Phase shifter block 110 outputs a phased shifted version of $X(t)$ or $P_{X(t)}$. The other input symbol stream $X(t)$ is input to offset block 106. Offset block 106 causes at least a one symbol period delay in the second input symbol stream $X(t)$ being input to offset block 106 to generate an offset version of $X(t)$ or $O(t)$. The delayed input symbol stream, $O(t)$, is then input to RF circuitry 116a and phase shifter block 108. Phase shifter block 108 outputs a phase shifted version of $O(t)$ or $P_{O(t)}$.
(Col. 3, lines 24-37.)

In the embodiment of FIG. 2, transmitter 200 receives input data and outputs an input symbol stream $X(t)$ at the output of CIM 204. $X(t)$ is split into two symbol streams with one symbol stream $X(t)$ being input to RF circuitry block 210 and phase shifter block 208. The output of phase shifter block 208 $P_{X(t)}$ is then input to RF circuitry 212. The other input symbol stream $X(t)$ is input to offset block 206. Offset block 206 causes an at least one symbol period delay in $X(t)$ to generate an offset version of $X(t)$ for $O(t)$. $O(t)$ is then input to RF circuitry block 214. $X(t)$ is transmitted on antenna 216 and, $P_{X(t)}$ and $O(t)$ are transmitted on antenna 218.
(Col. 4, lines 24-35.)

In the embodiment of FIG. 3a, transmitter 300 receives input data and outputs an input symbol stream $X(t)$ at the output of CIM 304. $X(t)$ is split into two symbol streams with one being input to switch 324 and the other being input to offset block 306. Offset block 306 outputs a delayed version of $X(t)$, or $O(t)$. Phase shifter 326 outputs $P_{O(t)}$, which is input to switch 324. Switch 324 functions to alternate transmission bursts between antennas 316 and 318, and antennas 320 and 322, respectively. For one burst period $X(t)$ is transmitted on antenna 316 and $O(t)$ is transmitted on antenna 318. For the next period $X(t)$ is transmitted on antenna 320 and $O(t)$ is transmitted on antenna 322. The delay diversity transmission is periodically alternated between antennas 316 and 318, and antennas 320 and 322. Every other burst from a burst Y is transmitted with a second order path diversity from antennas 316 and 318 and every other burst from a burst $Y+1$ is transmitted with a second order path diversity from antennas 320 and 322.
(Col. 5, lines 38-54.)

Kuchi teaches to delay a signal and phase shift a signal. *Delaying or phase shifting* a signal is *not* equivalent to *diagonal loading*, as defined in the context of the present invention and as would be understood by a person of ordinary skill in the art in view of the present disclosure.

In the Response to Arguments, the Examiner asserts that “the Applicant fails to show how diagonal loading is done” and that “what is shown in fig. 3b is the equivalent of fig. 4 of the Applicant’s specification.”

As noted above, the present disclosure teaches “diagonally loading” in FIGS. 4 and 6 and the associated text. As shown in FIG. 4, “*diagonal loading*” requires, for each antenna, transmitting on a particular distinct set of subcarriers while nulling the other subcarriers. The present specification teaches:

FIG. 4 illustrates long training symbols for a MIMO-OFDM system in accordance with the present invention, where the subcarriers from the training symbol of FIG. 3 are diagonally loaded across three exemplary transmit antennas. FIG. 4 illustrates the first 16 subcarriers seen at the input of the Inverse Fast Fourier Transform (IFFT) for each of three antennas, t_1^1 through t_1^3 , where t_n^i stands for the long training symbol transmitted on the n -th transmit antenna. In the example shown in FIG. 4, each subsequent subcarrier is transmitted on an adjacent antenna in a round robin fashion. Thus, only one-third of the subcarriers are transmitted on each antenna and the remaining subcarriers are nulled.

(Page 5, lines 17-25; emphasis added.)

Thus, contrary to the Examiner’s assertion, Appellants show how diagonal loading is done and what is shown in FIG. 3b of Kuchi is *not* the equivalent of FIG. 4 of the Applicant’s specification. As noted above, Kuchi teaches to *delay* a signal and *phase shift* a signal; Kuchi does *not* disclose or suggest “*diagonal loading*.”

The Examiner further asserts that the features upon which Applicant relies (i.e., “diagonal loading” requires, for each antenna, transmitting on a particular distinct set of subcarriers while nulling the other subcarriers) are not recited in the rejected claim(s).

As noted above, the specification and figures define the term “diagonal loading.” The term “diagonal loading”, as defined in the context of the present invention, is recited in the claims and should be given patentable weight.

Thus, Kuchi et al., alone or in combination, do not disclose or suggest transmitting or receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas, as variously required by independent claims 22, 26, 52 and 59.

Conclusion

The rejections of the cited claims under section 102 and 103 in view of Kuchi et al. and Gardner et al., alone or in any combination, are therefore believed to be improper and

should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

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CLAIMS APPENDIX

1-21. (Cancelled)

- 5 22. A method for receiving data on at least one receive antenna transmitted by a transmitter having a plurality of transmit antennas in a multiple antenna communication system, said method comprising the step of:

 receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order
10 receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas; and deferring for said indicated duration.

23. The method of claim 22, wherein said method is performed by a SISO receiver.

- 15 24. The method of claim 22, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

25. (Cancelled)

- 20 26. A receiver in a multiple antenna communication system having at least one transmitter having a plurality of transmit antennas, comprising:

 at least one receive antenna for receiving an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said
25 plurality of antennas; and
 means for deferring for said indicated duration.

27. The receiver of claim 26, wherein said method is performed by a SISO receiver.

- 30 28. The receiver of claim 26, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

29-41. (Cancelled)

42. The method of claim 22, wherein said duration is represented as a duration of said transmission.

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43. The method of claim 22, wherein said duration is represented as a length of said transmission.

10 44. The method of claim 22, wherein said SIGNAL field indicates a number of said antennas in said multiple antenna communication system.

45. The method of claim 44, wherein said number of said antennas allows said multiple antenna communication system to be scalable.

15 46. The method of claim 44, wherein said number of said antennas allows a receiver to correlate channel coefficients with corresponding transmit antennas.

47. The receiver of claim 26, wherein said duration is represented as a duration of said transmission.

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48. The receiver of claim 26, wherein said duration is represented as a length of said transmission.

25 49. The receiver of claim 26, wherein said SIGNAL field indicates a number of said antennas in said multiple antenna communication system.

50. The receiver of claim 49, wherein said number of said antennas allows said multiple antenna communication system to be scalable.

30 51. The receiver of claim 49, wherein said number of said antennas allows said receiver to correlate channel coefficients with corresponding transmit antennas.

52. A method for transmitting data by a transmitter having a plurality of transmit antennas in a multiple antenna communication system, said method comprising the step of:

determining an indication of a duration to defer until a subsequent transmission;

and

5 transmitting said indication of said duration to defer until said subsequent transmission, said indication transmitted such that said indication is capable of being interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas.

10 53. The method of claim 52, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

54. The method of claim 52, wherein said duration is represented as a duration of said transmission.

15 55. The method of claim 52, wherein said duration is represented as a length of said transmission.

56. The method of claim 52, wherein said SIGNAL field indicates a number of said antennas in
20 said multiple antenna communication system.

57. The method of claim 56, wherein said number of said antennas allows said multiple antenna communication system to be scalable.

25 58. The method of claim 56, wherein said number of said antennas allows a receiver to correlate channel coefficients with corresponding transmit antennas.

59. A transmitter in a multiple antenna communication system, comprising:

30 N transmit antennas for transmitting at least one training symbol using at least one of said N transmit antennas and transmitting an indication of a duration to defer until a subsequent transmission, said indication transmitted such that said indication is capable of being

interpreted by a lower order receiver by diagonally loading a SIGNAL field across said plurality of transmit antennas.

5 60. The transmitter of claim 59, wherein said indication is transmitted in said SIGNAL field that complies with the 802.11 a/g standards.

61. The transmitter of claim 59, wherein said duration is represented as a duration of said transmission.

10 62. The transmitter of claim 59, wherein said duration is represented as a length of said transmission.

63. The transmitter of claim 59, wherein said SIGNAL field indicates a number of said antennas in said multiple antenna communication system.

15 64. The transmitter of claim 63, wherein said number of said antennas allows said multiple antenna communication system to be scalable.

20 65. The transmitter of claim 63, wherein said number of said antennas allows a receiver to correlate channel coefficients with corresponding transmit antennas.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.